

Spot Safety Project Evaluation

Project Log # 200501247

Spot Safety Project # 06-95-005

**Spot Safety Project Evaluation, of the Flashing Traffic Signal Installation,
At the Intersection of SR 1006-Clinton Rd and SR 1835-Rockhill Rd,
In Fayetteville, Cumberland County**

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Carrie L. Goodrich

Traffic Safety Project Engineer

04/13/2005

Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-95-005 – The Intersection of SR 1006-Clinton Rd and SR 1835-Rockhill Rd, in Fayetteville, Cumberland County

Introduction

In an attempt to assess the safety of our roads, the Safety Evaluation Group of the Traffic Safety Systems Management Section has evaluated the above project. The methodologies used in this evaluation offer various philosophies and ideas, in an effort to provide objective countermeasure crash reduction results. A naive before and after analysis and an Odds Ratio comparison analysis of the treatment data has been completed to measure the effectiveness of the spot safety improvement. This information is provided to you so the benefit or lack of benefit for this type of project can be recognized and utilized for future projects.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an overhead flashing traffic signal. Representative Alex Warner originally requested improvements. Both SR 1006-Clinton Rd and SR 1835-Rockhill Rd are two-lane facilities with a speed limit of 45 mph at the treatment intersection. For the duration of this evaluation, the subject location was controlled by stop signs on SR 1835-Rockhill Rd. Three of the quadrants are commercially/ industrially developed with a No Parking ordinance along the southwest quadrant. A Railroad crossing exists just south of the intersection on SR 1835-Rockhill Rd. The crossing has gates and flashers and appropriate signs and pavement markings.

The initial crash analysis for this location was completed from January 1, 1991 through December 31, 1994 with a total of eighteen reported crashes. There were thirteen Angle crashes, three Left Turn-Cross Traffic crashes, one Rear End-Slow or Stop crash, and one Parked Vehicle crash, resulting in two class A injuries, eight class B injuries, and ten class C injuries. In addition, an Angle crash occurred in February 1995 which resulted in a fatality. A pattern of severe Angle crashes developed because vehicles were running the stop condition on SR 1835-Rockhill Rd, while others were entering the intersection and being struck by vehicles on SR 1006-Clinton Rd. This intersection was also identified by the 1995 Safety Program. The final completion date for the improvement at the subject intersection was on December 22, 1997.

Comparison Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from November 1, 1997 through February 28, 1998. The before period consisted of reported crashes from June 1, 1991 through October 31, 1997 (6 Years, 5 Months) and the after period consisted of reported crashes from March 1, 1998 through July 31, 2004 (6 Years, 5 Months). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed. The analysis also consisted of two different sets of data, the treatment and the comparison data. The treatment data consisted of all crashes within 150 feet of the subject intersection. The comparison data consisted of a sum of all crashes within 150 feet of ten intersections located near the treatment intersection. The ten intersections that comprise the comparison data are as follows:

SR 1006-Clinton Rd at SR 1842-Shelton Beard Rd.,
SR 1006-Clinton Rd at SR 1885-Hummingbird Pl.,
SR 1006-Clinton Rd at NC 24
SR 1006-Clinton Rd at SR 2013-Old Vanders Rd.,
SR 1006-Clinton Rd at SR 1831-Godwin Cir.,
SR 1006-Clinton Rd at SR 1837-Bladen Cir.,
SR 1006-Clinton Rd at SR 1837-Bladen Cir.,
SR 1006-Clinton Rd at SR 2000-Sunnyside School Rd.,
SR 1006-Clinton Rd at SR 2059-Joy Rd., and
SR 1006-Clinton Rd at SR 1834-Downing Rd.

Please see attached *Location Map* for further detail. The following data table depicts the Naive Before and After Analysis for the treatment and comparison intersections. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Head on; and Angle.

Treatment Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	29	32	10.3
Total Severity Index	10.06	9.44	- 6.2
Frontal Impact Crashes	24	30	25.0
Frontal Severity Index	11.32	10.00	- 11.7
Volume	5200	6700	28.8

Comparison Information

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Total Crashes	149	208	39.6
Total Severity Index	9.01	7.90	- 12.3
Frontal Impact Crashes	44	69	56.8
Frontal Severity Index	8.82	11.00	24.7
Volume	4000	5900	47.5

Odds Ratio: Treatment versus Comparison

	Before	After	Percent Reduction (-)/ Percent Increase (+)
Treatment Total Crashes	29	32	---
Comparison Total Crashes	149	208	- 21.0 %

The naïve before and after analysis at the treatment location resulted in a 10.3 percent increase in Total Crashes, a 6.2 percent decrease in the Total Severity Index, and a 28.8 percent increase in Average Daily Traffic (ADT). The comparison locations experienced a 39.6 percent increase in Total Crashes, a 12.3 percent decrease in the Total Severity Index, and a 47.5 percent increase in ADT. The before period ADT year was 1994 and the after period ADT year was 2001.

The Odds Ratio is used as another means of calculating the treatment effect. The number of crashes in the before and after period from the Comparison are used to calculate the percent reduction in crashes for the Treatment Intersection. As shown in the previous table, using the Odds Ratio calculation, there is a 21.0 percent decrease in Total Treatment Intersection crashes.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 10.3 percent increase in Total Crashes and a 25.0 percent increase in Frontal Impact Crashes. Using the Odds Ratio to calculate the treatment effect resulted in a 21.0 percent decrease in Total Crashes at the Treatment Intersection. The summary results above demonstrate that the treatment location appears to have had an increase in the number of Total Crashes and Frontal Impact Crashes from the before to the after period when using the naïve before and after analysis method. However, when using the Odds Ratio to calculate the treatment effect, there is a decrease in the number of Total Crashes from the before to the after period.

Please see the attached Treatment Site Photos. Photos are provided for each leg of the intersection. Upon field investigation, it appears that the traffic control has recently been changed from a two-way stop condition to a four-way stop condition at the treatment intersection. As shown in the photos, stop bars and Stop Ahead pavement markings and signs have also been added to each approach.

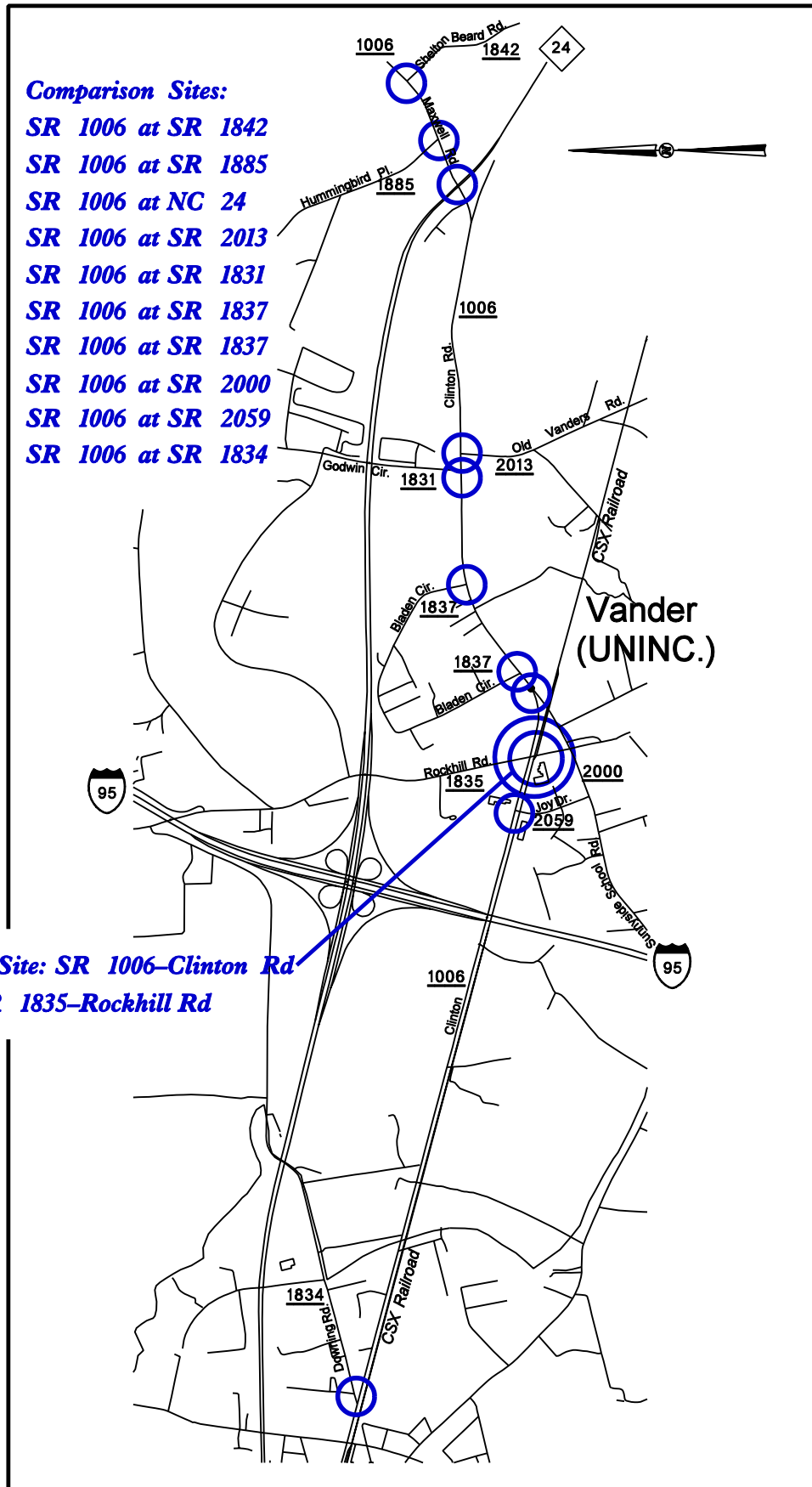
The countermeasure crash reduction for Total Crashes at the subject intersection can be in the range of a 21.0 percent decrease to a 10.3 percent increase in crashes. The countermeasure crash reduction for Frontal Impact Crashes at the subject intersection is a 25.0 percent increase in crashes. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors.

***Evaluation of Spot Safety Project Number 06-95-005
Location Map, Near Fayetteville, Cumberland County***

Comparison Sites:

***SR 1006 at SR 1842
SR 1006 at SR 1885
SR 1006 at NC 24
SR 1006 at SR 2013
SR 1006 at SR 1831
SR 1006 at SR 1837
SR 1006 at SR 1837
SR 1006 at SR 2000
SR 1006 at SR 2059
SR 1006 at SR 1834***

***Treatment Site: SR 1006-Clinton Rd
At SR SR 1835-Rockhill Rd***



Treatment Site Photos (Taken on February 25, 2005)



Looking north on SR 1835-Rockhill Rd.



Looking south on SR 1835-Rockhill Rd.

Treatment Site Photo (Taken on February 25, 2005)



Looking east on SR 1006-Clinton Rd.



Looking west on SR 1006-Clinton Rd.

Treatment Site Photo (Taken on February 25, 2005)

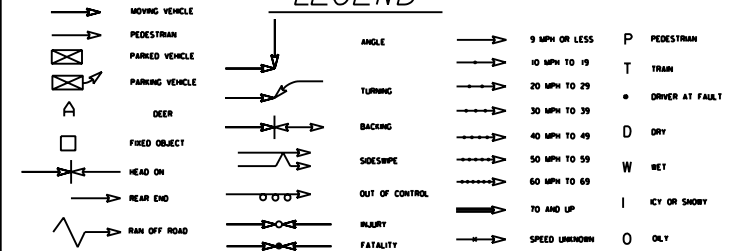


Photos looking north on SR 1835-Rockhill Rd and west on SR 1006-Clinton Rd.
Notice the “New Traffic Pattern” sign and the Stop Ahead warning signs and pavement markings,
which are placed on each approach.

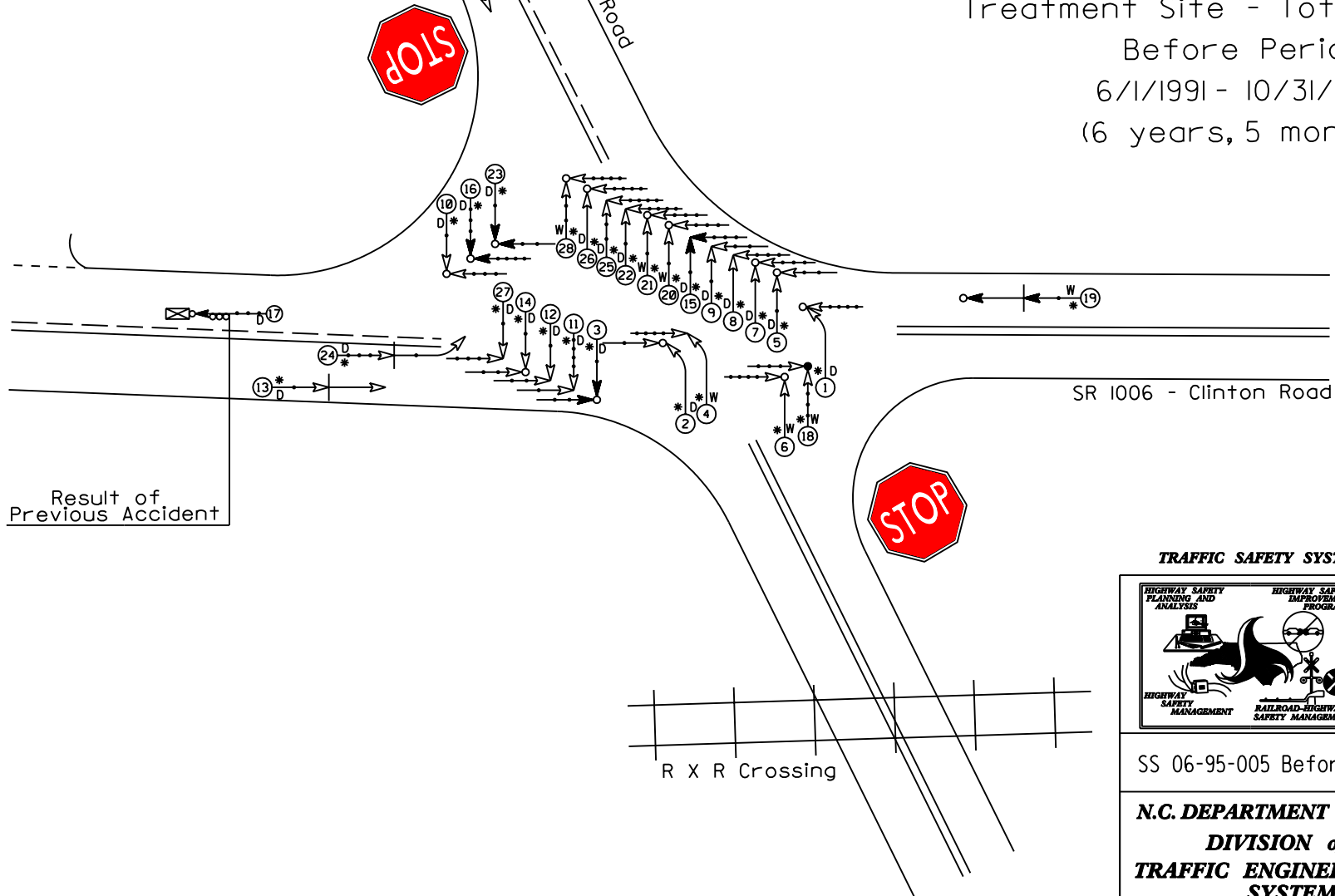
Sun Do
Gas Station /
Plaza

Monty
Pride
Meats

LEGEND



SS 06-95-005
Treatment Site - Total Crashes
Before Period
6/1/1991 - 10/31/1997
(6 years, 5 months)



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM	
DIVISION:	AREA:
STUDY PERIOD: 06/01/91 - 10/31/97	
DISTANCE: Y-LINE = 150 ft	
ANALYSIS PREPARED BY: CLG	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: CLG	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: 3/1/2004	
LOG NUMBER: 20050247	

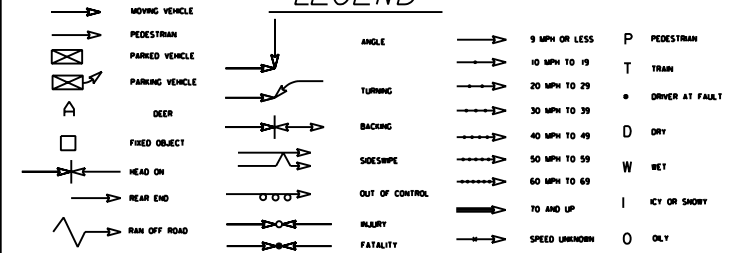
SS 06-95-005 Before

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH

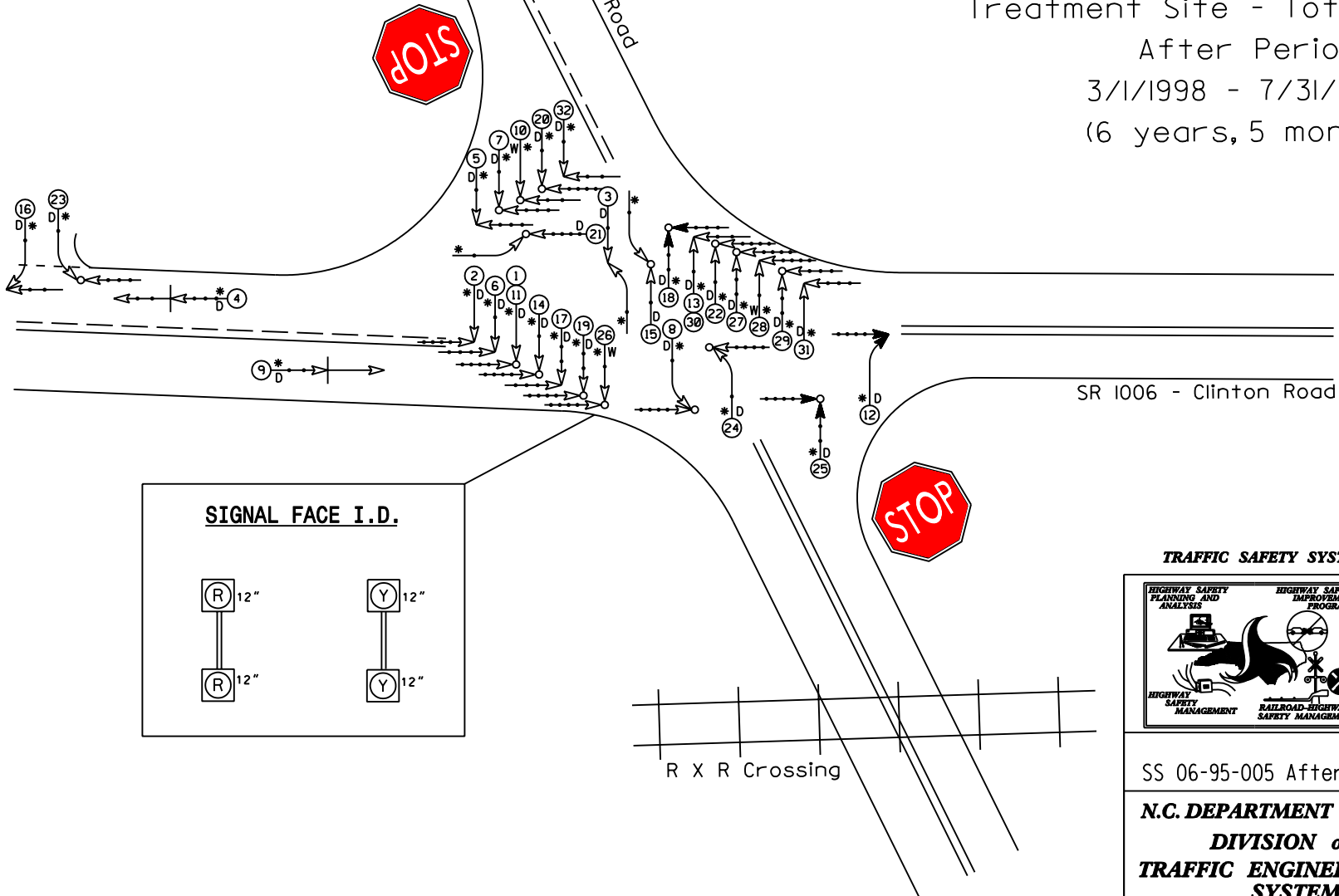
Sun Do
Gas Station /
Plaza

Monty
Pride
Meats

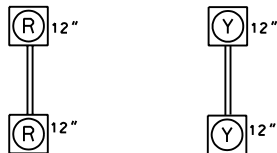
LEGEND



SS 06-95-005
Treatment Site - Total Crashes
After Period
3/1/1998 - 7/31/2004
(6 years, 5 months)



SIGNAL FACE I.D.



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



COLLISION DIAGRAM

DIVISION: AREA:

STUDY PERIOD: 03/01/98 - 07/31/04

DISTANCE: Y-LINE = 150 ft

ANALYSIS PREPARED BY: CLG

ANALYSIS CHECKED BY:

DIAGRAM PREPARED BY: CLG

DIAGRAM REVIEWED BY:

SS 06-95-005 After

SCALE: NOT TO SCALE

DATE: 3/1/2004

LOG NUMBER: 20050247

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY
SYSTEMS BRANCH